WHAT IS CLAIMED IS:

1. A method for delivering a biological material using a gene gun, comprising:

providing the gene gun comprising a pressurized chamber, a sprayer, a controller and a

material delivery system;

5   placing a sample solution into the material delivery system, wherein the sample solution

comprises at least the biological material;

triggering the gene gun and providing a gas through the control of the controller to the

pressurized chamber until the gas establishes a pressure;

releasing the sample solution from the material delivery system, so that the sample

10   solution is accelerated by the gas in the pressurized chamber; and

discharging the sample solution out of the sprayer, wherein the sprayer includes a spray

nozzle and a spray tube, and the spray nozzle comprises an interior contour, wherein the

interior contour of the spray nozzle comprises a diverging part and a converging part and

the spray tube is a diverging straight tube, so that a discharge speed of the sample solution

15   is supersonic and the biological material is evenly injected into a target.

2. The method of claim 1, wherein the biological material is a nucleic acid.

3. The method of claim 1, wherein the biological material is a protein.

4. The method of claim 1, wherein the biological material is a virion.

5. The method of claim 1, wherein the biological material is a vaccine.

20   6. The method of claim 1, wherein the biological material is an immunogen for cancer

immunotherapy.

7. The method of claim 1, wherein the sample solution is accelerated to a speed of 200-

300 m/s by the gas.

8. The method of claim 1, wherein a pressure at an outlet of the sprayer is about 1

atmospheric pressure.

9. The method of claim 1, wherein the spray nozzle further comprises a spray neck positioned between the diverging part and the converging part, and a range of the interior contour of the converging part includes:

5    $r_t < R_t < 2r_t$, wherein R_t represents a curvature radius of the converging part, r_t is a radius of the spray neck; and

wherein $\Theta < 15$ degrees, wherein Θ is an angle between the diverging part and a center axis of the spray tube.

10. The method of claim 1, wherein the gas includes a nitrogen gas or a helium gas.

10   11. A method for gene transformation by using a gene gun, comprising:

providing the gene gun comprising a pressurized chamber, a sprayer, a controller and a material delivery system;

placing a sample solution into the material delivery system, wherein the sample solution comprises at least a nucleic acid;

15   triggering the gene gun and providing a gas through the control of the controller to the pressurized chamber, wherein the gas is a nitrogen gas or a helium gas;

releasing the sample solution from the material delivery system after the gas in the pressurized chamber establishes a pressure, so that the sample solution is accelerated by the gas in the pressurized chamber; and

20   discharging the sample solution out of the sprayer, wherein the sprayer includes a spray nozzle and a spray tube, and the spray nozzle comprises an interior contour, wherein the interior contour of the spray nozzle comprises a diverging part and a converging part and the spray tube is a diverging straight tube, so that a discharge speed of the sample solution is supersonic and the biological material is evenly injected into a target.

12. The method of claim 11, wherein the sample solution is accelerated to a speed of 200-300 m/s by the gas.

13. The method of claim 11, wherein a pressure at an outlet of the sprayer is about 1 atmospheric pressure.

14. The method of claim 11, wherein the spray nozzle further comprises a spray neck positioned between the diverging part and the converging part, and a range of the interior contour of the converging part includes:

$r_t < R_t < 2r_t$, wherein R_t represents a curvature radius of the converging part, r_t is a radius of the spray neck; and

wherein $\Theta < 15$ degrees, wherein Θ is an angle between the diverging part and a center axis of the spray tube.

15. The method of claim 1, wherein the nucleic acid is used for gene therapy.